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# California Asphalt Production, Inc. Work Plan



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## Contents

1	Project Introduction .....	3
1.1	Work Plan Focus .....	3
1.2	Site Name or Sampling Area.....	4
1.3	Site or Sampling Area Location.....	4
1.4	Responsible Organization .....	4
1.5	Project Organization .....	5
2	Background .....	7
2.1	Site or Sampling Area Description .....	7
2.2	Operational History.....	7
2.3	Previous Investigations/Regulatory Involvement .....	7
3	Geological Information .....	8
3.1	Regional .....	8
3.2	Site-Specific .....	8
3.3	Hydrogeology .....	8
4	Project Data Quality Objectives.....	11
4.1	Project Objectives .....	11
5	Sampling Rationale .....	13
5.1	Surface Soil Sampling .....	13
5.2	Subsurface Soil Sampling .....	13
5.3	Ground Water Sampling.....	13
5.4	Other Sampling .....	13
6	Request for Analysis .....	15
6.1	Analyses Narrative .....	15
7	Field Methods and Procedures .....	21
7.1	Field Equipment .....	21
7.2	Media Sampling Procedures .....	21
7.3	Well Development .....	24
7.4	Water Sampling.....	25
7.5	Decontamination Procedures.....	28
7.6	Sample Containers, Preservation, Packaging and Shipping .....	28
7.7	Packaging and Shipping.....	29
8	Disposal of Residual Materials .....	30
9	Sample Documentation and Shipment.....	31
9.1	Field Notes .....	31
9.2	Labeling.....	32
9.3	Sample Chain-Of-Custody Forms and Custody Seals.....	32

10	Quality Control.....	33
10.1	Field Quality Control Samples.....	33
10.2	Background Samples .....	35
10.3	Field Screening, Confirmation and Split Samples.....	35
10.4	Laboratory Quality Control Samples .....	35
11	FIELD VARIANCES .....	35

## Tables

Table 1-1 – Key Project Personnel Contact Information and Responsibilities .....	6
Table 3-1 – Monitoring Wells .....	10
Table 6-1 - Media Sampling Plan.....	16
Table 6-2 - Analytical Matrix = Soil (Borings DH-1, DH-2 and DH-3, and possibly DH-4).....	18
Table 6-3 - Analytical Matrix = Groundwater .....	19
Table 6-4 - Analytical Matrix = Solids/Sludges .....	20

# 1 Project Introduction

This work plan has been prepared as a response to the U.S. Environmental Protection Agency, Region IX, (U.S. EPA), February 19, 2019 Administrative Order, U.S. EPA Docket No. RCRA 3013-09-2019-0001, (Order), request for a work plan to address potential hazardous waste violations and potential release of hazardous substances or waste to the environment.

## 1.1 Work Plan Focus

This work plan has been designed to address specific concerns outlined in the Order. Concerns addressed by this work plan include the following:

- California Asphalt Production, Inc. (CAP) #6 Asphalt Storage Sump (Asphalt Storage Unit, ASU)
  - Nature and extent of contents within ASU
  - Operational use and in/out process flows to/from the ASU
  - Nature and extent of possible release of hazardous substances from the ASU
  - Construction materials and integrity of the ASU
- CAP Oil Water Separator and RO Water Treatment System
  - Operational use and plumbing process flows in/out of the Oil Water Separator and RO Water Treatment System
  - Cleaning, calibration, of the systems
  - Management of sludge waste from the oil water separator
- CAP Waste and Chemical Management Plan (WCMP)
  - Document the WCMP, and current and past records showing the operational practices and programs to manage waste, non-waste, re-usable materials and recyclable materials at CAP.

CAP is an asphalt production facility located approximately 2.6 miles west of the City of Santa Maria, California. CAP was built in 1932-33 by The Five C Refining Company to produce petroleum products that did not include asphalt. In 1951, Douglas Oil Company of California acquired and upgraded the facility enabling it to produce asphalt. Conoco bought the facility by 1960 and retained ownership through late 1993 when the facility was sold to Saba Petroleum Company. Greka Energy acquired the facility in 1999 and has been operating the facility to produce asphalt, light naphtha, kerosene distillate, and gas oils, under the ownership name CAP.

CAP operates on approximately 24 acres and is adjoined by farmland and some undeveloped property on all sides. The plant processes heavy crude oil to produce a full line of asphalt products. The asphalt plant does not have gas processing facilities, unlike typical refineries, and only heavy crude oils are processed. The naphtha and other distillates separated in the refining, are sold to various markets for refinement into finished products. The facility has the capacity to process approximately 11,000 barrels per day.

The refining process begins as the crude oil is introduced to heat exchangers before being introduced to the Flash Tower. In the Flash Tower, the gas and water vapors are separated

from the heavy crude and sent to the Fractionator Tower while the heavy crude is sent through a heater before being introduced into the Fractionator Tower. The Fractionator Tower separates the crude into gas oil #1, kerosene distillates, naphtha, and heavy crude. The kerosene distillates and gas oil #1 are sent to a Stripper Tower before being sent to storage tanks before being shipped off the facility. The heavy crudes undergo further processing, after passing through another heater, in the Vacuum Tower. In the Vacuum Tower, asphalt is separated from more gas oil #1 & #2. The gas oils are sent to their respective storage tanks. The asphalt is sent through Asphalt/Crude Heat Exchangers before being sent to storage tanks. Light end vapors generated in the process are used as fuel in the burners.

The API oil water separator is a key element of the asphalt refining process, as is the Asphalt storage tanks and the ASU.

The following sections provide detail for the methods and procedures planned for implementation of this Work Plan, upon approval by the U.S. EPA.

## 1.2 Site Name or Sampling Area

The Focus of this sampling and analysis plan is on the following refinery locations:

API oil water separator (OWS) and Reverse Osmosis (RO)

Asphalt Storage Unit (ASU)

## 1.3 Site or Sampling Area Location

The CAP refinery is located 2.6 miles west of the nearest residential area of Santa Maria, California.

The street address of the refinery is 1660 Sinton Road, Santa Maria, CA 93458. The refinery is located on the East side of Sinton Road and the administrative office is located on the West side across Sinton from the refinery main gate. Greka owns property on all sides of the refinery, except the county road.

Figures are presented at the end of the work plan.

Figures 1 and 2, provide a regional and local site location for the CAP refinery.

## 1.4 Responsible Organization

CAP has retained ZMassociates Environmental Corporation to prepare this Work Plan, and to subcontract applicable contractors experienced and suited in performance of work detailed in the Work Plan and will participate in writing the Sampling and Analysis sections of the plan. Patrick Randall, P.E. will develop elements of the work plan due to his previous experience with the CAP refinery, by installing groundwater monitoring wells near the ASU, and North of the oil water separator. Mr. Randall will provide the required California Professional Engineer certification of this work.

## 1.5 Project Organization

Below, Table 1-1 – Key Project Personnel Contact Information and Responsibilities, lists key participants in preparing the Work Plan and responsible for implementation of the work once approved by U.S. EPA.

Table 1-1 – Key Project Personnel Contact Information and Responsibilities

<b>Title</b>	<b>Name</b>	<b>Phone Number &amp; Email Address</b>	<b>Responsibilities</b>
<b>EPA Project Manager</b>	<b>TBD</b>		
<b>EPA Quality Assurance Officer (QAO)</b>	<b>TBD</b>		
<b>Work Plan Project Coordinator acting on behalf of CAP, Inc.</b>	<b>Stephen Ward GIT, Inc.</b>	<b>(805) 357-2938 sgw@greka.com</b>	<b>Environmental Engineer, oversee contractor(s) in development of work plan through approval and implementation.</b>
<b>Contractor Project Manager (include Company Name)</b>	<b>Thomas Miller, Ph.D. Zmassociates Env. Corp.</b>	<b>(949) 608-9890 thomas@zmasociates.com</b>	<b>Contract Lead, Lead development of work plan, and implementation using subcontractor assistance</b>
<b>Contractor QAO</b>	<b>Thomas Miller, Ph.D. Zmassociates Env. Corp.</b>	<b>(949) 608-9890 thomas@zmasociates.com</b>	<b>Contract Lead, Lead development of work plan, and implementation using subcontractor assistance</b>
<b>Contractor Field Team Leader</b>	<b>Patrick Randall, P.E. Zmassociates Env. Corp.</b>	<b>(805) 390-5501, or (949) 608-9890 pat@zmassociates.com</b>	<b>Support preparation of work plan – SAP. Manage field team to implement work plan.</b>
<b>Laboratory Quality Assurance Officer (include Laboratory Name)</b>	<b>TBD upon approval by U.S. EPA and selection of qualified laboratory.</b>		

## 2 Background

This section provides an overview of the location, previous investigations, and the areas of concern as expressed by the U.S. EPA, associated with the site or sampling area.

### 2.1 Site or Sampling Area Description

The site is located in Santa Barbara County, within the state of California, outside the city of Santa Maria (Figure 1). The site layout is shown on Figure 2. Asphalt Storage Tanks and the ASU, the subject of this workplan, is marked on Figure 2 within the site layout.

The ASU occupies an area of approximately 300 feet by 200 feet. The site is bordered on the north by the refinery operation, on the west by on-site storage tanks and Sinton Road, on the south by onsite open space, on the east by transportation operations, followed by open space. The specific location of the site or sampling area is shown in Figure 2.

### 2.2 Operational History

Currently, the Site is used for the refining of asphalt products, distillate, and naphtha with a permitted production capacity of 11,000 barrels (bbl.) per day. The refinery is currently owned and operated by CAP. The refinery was initially constructed in 1932 by the Five C Refining Company and was used to produce naphtha, kerosene distillates, diesel fuel and residuum from oils extracted from the surrounding region. In 1951 the refinery was upgraded to produce asphalt after being acquired by Douglas Oil Company of California. The refinery was acquired by Conoco Inc. (known as ConocoPhillips after August 30, 2002) in 1960, which operated the refinery for 34 years at a capacity of 10,000 barrels per day. In 1994 the refinery was purchased from Conoco Inc. by Saba Petroleum Company. The same year Saba was acquired by the Santa Maria Refining Company controlled by Greka Energy. Currently the refinery operates as California Asphalt Production, Inc. (CAP)

### 2.3 Previous Investigations/Regulatory Involvement

Voluntary and regulatory requested site investigations have been performed at the Site since the early 1990's.

Groundwater monitoring at the site is well documented in the California Environmental Protection Agency (Cal EPA) State Water Resources Control Board (SWRCB) GeoTracker database (SWRCB 2018). It is important to note, there have been no exceedance of regulatory thresholds for metals, volatile or semi-volatile organic compounds since groundwater monitoring began, in the early 1990's through till 2014 when the SWRCB approved discontinuing of quarterly groundwater monitoring. Discontinuance was based on agreement there are no contaminants migrating from refinery operations into the upper groundwater zone, beneath or in the near vicinity of the refinery operations. This data includes at least 10 quarters of groundwater monitoring after installation of new monitoring wells, installed around the ASU. Complete monitoring records are available through GeoTracker and the California Envirostor databases.



## 3 Geological Information

### 3.1 Regional

According to the U.S.G.S. 7.5' Quadrangles for Guadalupe and Santa Maria, the Santa Maria Valley is bounded by the foothills of the San Rafael Mountains to the northeast, the Casmalia Hills to the south (near the coast), and the Solomon Hills to the southeast. These highlands range from 1,300 feet to 4,000 feet AMSL. The Project Site is located within the Santa Maria Valley structural block, within the Los Osos kinematic domain of south-central coastal California (Lettis, W.R., et al, 2004). The Los Osos domain is characterized by West-northwest striking reverse faults that bound eight similarly trending structural blocks. The Santa Maria Valley structural block is at present a subsiding or locked sediment-filled basin (Lettis, W.R., et al, 2004).

Based on a review of the Thomas W. Dibblee, Jr. map titled Geologic Map of the Point Sal and Guadalupe Quadrangles, dated 1989, the Project Site is underlain by alluvial sediments of Holocene to Pleistocene age from the ground surface to an approximate depth of 100 feet. This geologic deposit is underlain by eolian sand and alluvium of the Pleistocene-aged Orcutt Formation to an approximate depth of 400 feet. The Orcutt Formation is underlain by alluvium of the Plio-Pleistocene-aged Paso Robles Formation to an approximate depth of 1,400 feet.

The Paso Robles Formation is underlain by marine Tertiary-aged bedrock formations, including the Careaga Sand, Foxen Mudstone, Sisquoc, and Monterey Shale. The Foxen Claystone, Sisquoc, and Monterey Shale formations all yield oil. The Monterey Shale extends to depths of at least to 3,600 feet, and is underlain by the Jurassic-Cretaceous-aged Franciscan basement complex (Dibblee, 1989 and 1994).

### 3.2 Site-Specific

The maximum depth during the preliminary groundwater assessment activities completed at the Project Site was to approximately 138 feet. Earth materials encountered generally consisted of unconsolidated sediments comprised of interbedded layers of clay, silt and silt/sand mixtures. Poorly graded fine to medium grained sands were encountered with groundwater.

### 3.3 Hydrogeology

#### **Regional**

The Project Site is located within the Santa Maria Valley Groundwater Basin (Basin) (Department of Water Resources [DWR], 2003). Groundwater within the Basin occurs in alluvium, dune sands, and the Orcutt Formation, Paso Robles Formation, Pismo Formation, and Careaga Sand (DWR, 2003). Groundwater conditions are unconfined within most of the Basin, with the exception of within the coastal portion where groundwater conditions are confined (DWR, 2003). The regional aquifer groundwater flow direction is toward the west-northwest.

Historical water well records indicate that groundwater within the regional aquifer fluctuates between approximate depths of 90 feet to 175 feet. Currently, depth to groundwater within the regional aquifer in the area of the Project Site reportedly occurs at approximate depths of 90 feet. Discontinuous zones of perched groundwater exist within the Basin.

### **Site-Specific**

Groundwater monitoring wells were first installed in October 1998 at the site (MW-1- MW-8). Wells MW-6 and MW-8 were dry wells replace with MW-6a and MW-9 (respectively) in September and November of 2010. First groundwater at the Project Site was encountered at an approximate depth of 89 and 91 feet below ground surface during the installation of MW-6a and MW-9. Table 3-1 shows the groundwater elevation, depth to water, total depth, screen interval, construction diameter and material, and surveyed top of casing elevation above mean sea level (MSL), Depth to groundwater (DTW) was measured during groundwater monitoring in November 2012.

The groundwater gradient was determined to be approximately 0.026 ft/ft, and the direction of flow mostly easterly (Figure 3). This determination was made by triangulation of GW elevation for MW-5, MW-6a and MW-9. It should be noted that the DTW is not within the screened intervals of MW-1, MW-2, MW-3, and MW-4.

Table 3-1 – Monitoring Wells

<b>Well Number</b>	<b>GW Elevation (11/20/2012)</b>	<b>DTW (11/20/2012)</b>	<b>Total Depth</b>	<b>Screen Interval</b>	<b>Diameter/Material</b>	<b>TOC above MSL</b>
MW-1	69.20	92.50	137	107-137	4-inch Sch. 40 PVC	161.70
MW-2	69.11	85.46	138	108-138	4-inch Sch. 40 PVC	154.57
MW-3	68.95	91.04	138	108-138	4-inch Sch. 40 PVC	159.99
MW-4	68.81	87.15	137	107-137	4-inch Sch. 40 PVC	155.96
MW-5	71.37	85.77	93	63-93	4-inch Sch. 40 PVC	157.14
MW-6	Abandon		60	Abandon	4-inch Sch. 40 PVC	165.71
MW-6a	71.27	94.62	99	79-99	4-inch Sch. 40 PVC	165.89
MW-7	70.98	90.04	100	70-100	4-inch Sch. 40 PVC	161.02
MW-8	Dry	Dry	89	59-89	4-inch Sch. 40 PVC	160.72
MW-9	70.71	90.45	100	80-100	4-inch Sch. 40 PVC	161.16

## 4 Project Data Quality Objectives

### 4.1 Project Objectives

The EPA has requested information to determine the nature and extent of potential releases from the ASU. An order was issued (RCRA 3013-09-2019-00010 and a summary of the order requirements follows. Meeting these requirements is the project objective.

“Based on the Findings of Fact and Determinations and Conclusions of Law, Respondent is to hereby ordered, pursuant to Section 3013(a) of RCRA, 42 U.S.C. & 6934(a), to submit an electronic copy and hardcopy of a written proposal to EPA, within (30) days of the issuance of this Order, for carrying out sampling, analysis, and reporting to ascertain the nature and extent of the hazard posed by the hazardous wastes that are present at or that may have been released from the Respondent’s Facility (Work Plan”). Respondent is hereby ordered to implement such Work Plan once approved or modified and approved by EPA. Such written Work Plan shall be specific and shall include, but is not limited to, the following:

- The Work Plan prepared and certified by an independent qualified profession engineer, registered in California, shall be designed to determine the presence, magnitude, extent, direction and rate of movement of any hazardous wastes, hazardous constituents, or contaminants or concern (e.g. benzo(a)pyrene) within and beyond the surface impoundment and must include the following:
- A description of the surface impoundment to include, age, capacity, and construction. Copies of any existing surface impoundment construction figures or drawings must be referenced in the Work Plan and included as an appendix;
- A detailed description of the known geology and local groundwater conditions, including depth to groundwater, groundwater gradient, groundwater quality and groundwater use;
- A detailed summary of Respondents’ current written surface impoundment inspection and maintenance procedures;
- Development and implementation of a survey to evaluate the existing structural integrity of the surface impoundment;
- Development and implementation of an assessment to determine the types(s), quantity(ies), and classifications(s) of wastes and wastewaters that are currently stored in the surface impoundment. The proposed number of waste and wastewater samples, proposed analytical parameters, sample location and sample depth of waste to complete this task must be identified on a site map and included in the Work Plan and
- Development and implementation of a plan to determine the extent of soil and groundwater contamination both on-site and off-site originating from the surface impoundment. The number and location of soil borings and monitoring well construction must be identified on a site map and included in the Work Plan. The collection of soil borings from ground surface to the groundwater table must be visually inspected for contamination, and physical properties documented and photographed. Visibly contaminated soil will be analyzed pursuant to the approved Work Plan parameters (e.g.

total and Toxic Characteristic Leaching Procedure (TCLP) benzene, total petroleum hydrocarbons, California Title 22 metals). If no visible contamination is observed in the soil boring, Respondent will provide a recommended sampling interval to obtain samples from each soil boring (e.g. surface, 12 inches, 24 inches). The number and placement of groundwater monitoring wells must be sufficient to assess the nature and extent of groundwater contamination.

Groundwater monitoring wells installed as part of the implementing the Work Plan, will be sampled and analyzed on a quarterly basis. A proposed quarterly groundwater monitoring program and schedule must be included in the Work Plan.”

## 5 Sampling Rationale

### 5.1 Surface Soil Sampling

Exact soil sampling locations and number of samples will be determined in the field based upon a site walk with the U.S. EPA representative assigned to work with the project team. Samples selected will be evaluated for laboratory analysis based on the presence of staining and/or PID screening. Field identified surface soil sample locations will be evaluated for subsurface soil sampling. Soil sample locations will be recorded in the field logbook as sampling is completed. A sketch of the sample location will be entered in the logbook and any physical reference points will be labeled. If possible, distances to the reference points will be given.

### 5.2 Subsurface Soil Sampling

The ASU with proposed subsurface soil sampling locations are shown on Figure 4. ZMassociates proposes the advancement of three drill holes (DH-1 through DH-3), and the field team will be prepared to drill a fourth location if the site walk with the U.S. EPA believes it necessary. The three locations were chosen by triangulation of groundwater elevation between former groundwater monitoring wells MW-5, MW-6a and MW-9, shown on Figure 4. Each location will be completed as a groundwater monitoring well.

### 5.3 Ground Water Sampling

The ASU is shown on Figure 4. ZMassociates proposes the advancement of three drill holes (DH-1 through DH-3) at the Project Site. The three locations were chosen by triangulation of DTW between former groundwater monitoring wells MW-5, MW-6a and MW-9, shown on Figure 4. Each location will be completed as a groundwater monitoring well. The layout of the proposed wells shows one up-gradient and two down-gradient wells. These locations were chosen to insure interception of any release to groundwater from the ASU.

### 5.4 Other Sampling

#### ASU Assessment

Information will be collected as to provide an accurate description of the ASU to include, age, capacity, and construction. Copies of any existing surface impoundment construction figures or drawings will be provided. A minimum of 2 geotechnical samples will be collected and evaluated by standard testing procedures and a Standard Penetration Test will be performed during the drilling of DH-2 or DH-3 to evaluate the existing structural integrity.

For this assessment, multiple sources of information will also be reviewed, including:

- Previous impoundment inspection reports
- Operating and Management Plan
- Topographic plans and aerial photos
- Construction drawings
- Subsurface information
- Geotechnical laboratory test results

- Slope stability evaluations
- Correspondence
- Interviews with site workers.

The principal use of **the** ASU is storage of an asphalt product which can be reheated and transferred to the refinery process for reuse. Due to being open, the ASU will also accumulate rainwater.

API separator effluent is usually pumped to Tank 2003 (heat traced). Hot water from Tank 2003 is trucked from the refinery to various production wells as needed to aid production. When Tank 2003 is full, API separator effluent is pumped to ASU. Frequency could be described as at least occasional. On a less frequent basis, asphalt product from spills within the refinery is placed into the ASU for reprocessing and reuse.

ASU water is what feeds the RO unit (adjacent to the API separator). One hundred percent of RO feedwater comes from the ASU. 100% of RO effluent is pumped into Tank 7001, then to a water-softner, then to various points within the plant as a feedwater stream – Boiler feedwater, emulsion plant feedwater, etc.

#### Process Sampling Justification

Sampling of the processes associated with the ASU and of materials within the ASU will be performed to characterize the materials transferred to the ASU at each source and characterize the material currently collected within the ASU. In addition to samples collected within the ASU the following process units will be sampled to characterize the material transferred to the ASU:

- **API Oil Water** Separator Effluent
- RO unit Effluent
- Tank 40001 Discharge
- Tank 10001 Discharge

The ASU has been identified as having a total depth of approximately 29 feet containing mostly asphalt. The surface of the ASU is not stable enough to support sampling personnel or equipment safely. All sampling will occur at effluent piping and from the areas reachable in a safe manner from the edge of the ASU.

Water is discharged from the bottom of the ASU to the RO unit. This water will be collected and analyzed to determine any chemical contamination in the water. The water will contain the accumulation of water from other potential sources, Tank 40001, Tank 10001, RO unit, and rainwater.

Samples of water, sludge or non-asphalt solids (soils and other materials) found on the banks or surface (within safe reach) will be sampled for analysis.

With the assistance of refinery personnel any additional sample points which can be identified will be sampled and submitted for laboratory analysis.

## 6 Request for Analysis

### 6.1 Analyses Narrative

Table 6-1 below shows the media to be samples, minimum number of samples, analysis methods and the rational for sample collection. More detail is provided on each topic in following sections.



Table 6-1 - Media Sampling Plan

<b>Sample Media</b>	<b>Minimum Number of Samples</b>	<b>Analyses Method</b>	<b>Rational</b>
<b>Groundwater</b>	One each well, Three Wells	VOCs (8260B), SVOCs (8270D), Title 22 Metals (6010B/7470) and PAHs (8270SIM)	Determine if Groundwater has been affected by ASU
<b>Soil</b>	Two per boring, one vadose zone, one within water bearing zone	VOCs (8260B), SVOCs (8270D), Title 22 Metals (6010B/7470) and PAHs (8270SIM)	Determine if soil nearby ASU has been affect by releases
<b>Process Sludges</b>	One per process (when present)	VOCs (8260B), SVOCs (8270D), Title 22 Metals (6010B/7470) and PAHs (8270SIM)	Characterize process waste
<b>Process Waters</b>	One per process (when present)	VOCs (8260B), SVOCs (8270D), Title 22 Metals (6010B/7470) and PAHs (8270SIM)	Characterize process waste
<b>Field Blank</b>	1 per 20 samples or 1 per day of field activity	VOCs (8260B)	Evaluate the effects of ambient conditions and sample containers on accuracy

<b>Trip Blank</b>	1 per cooler containing samples	VOCs (8260B)	Evaluate how shipping and handling procedures are affecting accuracy by introducing contaminants into the samples
<b>Equipment Blank</b>	1 per 20 samples or 1 per day of field activities	VOCs (8260B)	Evaluate sample equipment and/or field decontamination effects on accuracy
<b>Duplicate Samples</b>	1 per 20 samples or 1 per day of field activities	VOCs (8260B), SVOCs (8270D), Title 22 Metals (6010B/7470) and PAHs (8270SIM)	Assess the effects of sample collection technique on sample precision

Table 6-2 - Analytical Matrix = Soil (Borings DH-1, DH-2 and DH-3, and possibly DH-4)

<b>Contaminate of Concern</b>	<b>Analytical Method</b>	<b>Packaging and Preservation</b>	<b>Maximum Holding Times</b>
<b>VOCs</b>	USEPA 8260B	3 x 5g EnCore-type samplers/ unpreserved	14 days
<b>SVOCs</b>	USEPA 8270D	6" Brass Sample Tube unpreserved	7 days
<b>PAHs</b>	USEPA 8270SIM	6" Brass Sample Tube / unpreserved	7 days
<b>Metals</b>	USEPA 6010B/7470	6" Brass Sample Tube / unpreserved	7 days

Table 6-3 - Analytical Matrix = Groundwater

<b>Contaminate of Concern</b>	<b>Analytical Method</b>	<b>Packaging and Preservation</b>	<b>Maximum Holding Times</b>
<b>VOCs</b>	USEPA 8260B	(3) 40 ml vials preserved with HCL	14 days
<b>SVOCs</b>	USEPA 8270D	(2) 1L amber glass, unpreserved	7 days
<b>PAHs</b>	USEPA 8270SIM	(2) 1L amber glass, unpreserved	7 days
<b>Metals</b>	USEPA 6010B/7470	1 x 4 oz. Glass Jar/ unpreserved	7 days

Table 6-4 - Analytical Matrix = Solids/Sludges

<b>Contaminate of Concern</b>	<b>Analytical Method</b>	<b>Packaging and Preservation</b>	<b>Maximum Holding Times</b>
<b>VOCs</b>	USEPA 8260B	1 x 4 oz. Glass Jar	14 days
<b>SVOCs</b>	USEPA 8270D	1 x 4 oz. Glass Jar	7 days
<b>PAHs</b>	USEPA 8270SIM	1 x 4 oz. Glass Jar	7 days
<b>Metals</b>	USEPA 6010B/7470	1 x 4 oz. Glass Jar	7 days

## 7 Field Methods and Procedures

### 7.1 Field Equipment

#### **List of Equipment Needed**

Decontamination: brushes, sponges, buckets

Soil Sampling: Split Spoon sampler, hand auger, bucket

Groundwater Sampling: Pumps, disposable tubing, water level meter, pH/specific conductance meter, buckets.

#### **Calibration of Field Equipment**

Field instrumentation and health and safety monitoring instrumentation will be calibrated daily or in accordance with the manufacturer's recommendations. The photoionization detector (PID) used for screening of samples for VOC will be calibrated daily with the manufacturer's recommendations using a 100 ppm hexane standard gas. The water quality meter used for screening of samples for VOC will be calibrated daily with the manufacturer's recommendations using standards for pH, turbidity and specific conductance provided by the manufacturer.

#### **Field Screening**

Soil samples will be screened using a PID calibrated with 100 ppm hexane. Grab samples of approximately 4 oz will be collected from the composite bucket for surface soils and process sludges and spoils of the hollow stem auger for subsurface soil samples. The sample will be placed in a 1-quart plastic storage bag. The sample will be allowed to equilibrate for approximately 5 minutes and then be testing by opening the bag slightly and inserting the PID probe. The reading will be allowed to stabilize for approximately 1 minute and the reading recorded in the daily log book. The sample date, time location, depth, and soil characteristic will also be recorded.

### 7.2 Media Sampling Procedures

#### **Surface Soil Sampling**

Exact soil sampling locations will be determined based on the site walk with the U.S. EPA and locations at the ASU area, based on accessibility, visible signs of potential contamination (e.g., stained soils), and topographical features which may indicate the location of hazardous substance disposal (e.g., depressions that may indicate a historic excavation). Soil sample locations will be recorded in the field logbook as sampling is completed. A sketch of the sample location will be entered into the logbook and any physical reference points will be labeled. If possible, distances to the reference points will be given.

Samples to be analyzed for volatile organic compounds will be collected first. Surface soil samples for VOC analyses will be collected as grab samples (independent, discrete samples) from a depth of 0 to 12 inches below ground surface (bgs). Surface soil samples will be collected using small trowel and/or shovel. Sample containers will be sealed, labeled, and placed in a zip lock bag.

### **Subsurface Soil Sampling**

The ASU is shown on Figure 4. ZMassociates proposes the advancement of three drill holes (DH-1 through DH-3) at the Project Site. Eight-inch drill holes will be advanced utilizing a hollow stem auger drilling rig operated by a California licensed drilling contractor. The top 5 feet of each drill hole will be manually advanced using a hand auger, a surface sample from each drill hole will be screened for laboratory analysis. The total depth will be approximately 100 feet bgs.

During the drilling activities, soil samples will be retained each 5-feet of depth and screened for chemical analyses by collection in 6-inch brass or stainless-steel sleeve within a split spoon sample tube. Soil samples submitted to the analytical laboratory sealed with Teflon® tape placed on each end of sleeve and plastic end caps are affixed to each end of the sample sleeve. Representative soil samples will lithologically logged using the Unified Soil Classification System (USCS) and screened for the presence of volatile organic compounds (VOCs) using a photoionization detector (PID) calibrated to 100 ppm hexane. Soils showing discoloration due to contamination of levels over 10 ppm as hexane using the PID will be retained for chemical analysis. Soil samples that are retained for chemical analyses will preserved on ice in the field and COC forms used to document sample management procedures. At each boring, at least one sample will be collected from 30 feet bgs (estimated bottom of the ASU) and the interval that will be the monitoring well intake interval (i.e., screened interval).

### **Groundwater Well Installation and Development**

At the conclusion of the soil sampling activities, the drill holes will be completed to 2" PVC groundwater monitoring wells. Figure 4 shows the proposed well locations. All well locations will be surveyed by a California-licensed Professional Land Surveyor.

### **Monitor Well Construction Details**

The monitor wells will be constructed so that the top of the well screen is just above the water table. In the event that the groundwater bearing zone has a continuous interval greater than 15 feet in vertical length, a second monitor well will be installed to monitor the deeper portion of the zone. In either case, monitor well screens will not be greater than 15 feet long.

Monitoring well construction details will be documented on the appropriate Well Construction Log. No water will be introduced during monitoring well construction unless the borehole conditions require stabilization. If required, the water will be obtained from the public water supply system.

1. The screened interval for all monitoring wells is anticipated to be 5 and 10-foot sections of factory-milled 10-slot, 2-inch O.D., schedule 40 PVC screen, placed in the bottom of each well. The well screen attached to threaded, flush joint, 2-inch O.D., schedule 40 PVC casing will be inserted in the borehole through the minimum 6.25-inch O.D. hollow-stem auger.
2. The screened interval of the monitoring wells are anticipated to be 80-90 ft bgs.
3. PVC casing will be threaded to the screen and brought to a height of 3 feet above ground level for completion.
4. The annular space between the well and the borehole wall will be backfilled with a clean, graded, size 20 to 40 silica sand pack that will extend from the bottom of the borehole to a minimum of 2 feet above the top of the screened interval. The sand pack will be placed by tremie pipe from the bottom of the borehole through the hollow-stem augers to ensure complete placement around the well screen. The hollow stem auger will be retrieved as the sand pack is emplaced and can typically serve as the tremie pipe for filter pack placement.
5. Approximately 1 foot of very fine sand grade size 50 or smaller may be emplaced above the filter pack to prevent the migration of the bentonite slurry into the well screen.
6. A minimum thickness of 3 feet of bentonite pellets or chips will be placed on top of the filter pack as a seal. If the seal is within the unsaturated zone at the time of installation, granular bentonite will be placed in 1-foot lifts, saturated with potable water, and allowed to hydrate. Hydration time will conform to the manufacturer's recommendations before further work on the well is performed.
7. The annular space from the top of the bentonite seal to within 1 foot beneath the frost line (approximately 30 to 36 inches bgs) will be filled with a cement and bentonite slurry containing high solids mixed to the manufacturer's specifications. Alternatively, cement/bentonite slurry consisting of 8 gallons water and 5 percent bentonite by weight per bag of Portland cement will be used, with a target density of 14 to 15 pounds per gallon. The bentonite slurry will be placed with a tremie pipe from the bottom of the annular area to be grouted to ensure proper placement of the slurry.
8. The remaining annular space near land surface will be filled with concrete. All wells with aboveground surface completions will be completed above grade using a protective steel cover. A concrete apron will be installed around the cover. The apron will be a minimum of 2 feet by 2 feet and 6 inches in thickness and shall be sloped to promote drainage away from the well. The wells will also be equipped with locking caps.
9. At selected locations, steel guard posts or protective barriers will be installed around the wells in a manner designed to prevent vehicles from accidentally damaging the well.



### 7.3 Well Development

A newly completed monitoring well will not be developed for at least 24 hours after the surface pad and outer protective casing are installed. This will allow sufficient time for the well materials to cure before development procedures are initiated.

The main purpose of developing new monitoring wells is to remove the residual materials remaining in the wells after installation has been completed, and to try to re-establish the natural hydraulic flow conditions of the formations which may have been disturbed by well construction, around the immediate vicinity of each well.

New monitoring wells will be developed until the column of water in the well is free of visible sediment, and the pH, temperature, turbidity, and specific conductivity have stabilized. The onsite geologist should make the decision as to the development completion of each well. All field decisions will be documented in the field log book.

The following development procedures, will be used to develop wells:

1. Bailing
2. Pumping/over pumping
3. Surging

#### **Bailing**

Bailing is used to remove large amounts of sediment and sand from the well. By quickly bailing many wells can be dewatered and sediment in the water removed. Bailing continues until there are significant changes in the turbidity as observed by the onsite geologist.

#### **Pumping**

Monitoring wells in permeable formations can be developed by pumping water from the well at a high-flow rate. This method is generally not as effective as the above methods as the flow rates required to remove fines from the well walls are difficult to achieve.

When developing a well, techniques should be used that progress from gentle to vigorous agitation. Rapid dewatering of the well should be avoided in the early stages of development as it may collapse the screen or casing. During development, the well yield should be estimated by monitoring the rate of recovery of water level in the well after pumping. This information can then be used to select suitable methods for subsequent purging and sampling.

#### **Surging**

Development by surging involves surging water in and out of the screen and into the surrounding aquifer by using a surging block or a bailer. If a surging block is used, the well will need to be bailed or pumped to remove the accumulated sediment from the bottom. sampling. Surging will be used in conjunction with pumping to remove sediment from the well screen and pumped out of the well.

## **Sediment/Sludge Sampling**

ZMassociates will work with refinery personnel to identify sample points at each process. Solid and water samples will be collected as appropriate to determine the characteristics of material discharged into the ASU.

Exact sediment sampling locations will be determined from the ASU in the field, based on visually screening with a PID. Sediments/Sludges which are visibly different for the stored asphalt product will be sampled. Areas within the ASU will be screened with the PID and samples collected when screening indicates values over 100 ppm as hexane. Care will be taken to obtain as representative a sample as possible. The sample will be taken from areas likely to collect sediment deposits, such as edges and areas which have been impacted by discharge from pipes or other releases.

Material in the sampler will be transferred to a sample-dedicated one-gallon disposable pail and homogenized with a trowel. Material from the pail will be transferred with a clean trowel from the bucket to the appropriate sample containers. Sample containers will be filled to the top, taking care to prevent soil from remaining in the lid grooves prior to being sealed in order to prevent potential contamination migration to or from the sample containers.

## **7.4 Water Sampling**

### **Process Water Sampling**

Samples will be collected by hand or with a sample bottle holder. For samples taken at a single depth, the bottle should be uncapped and the cap protected from contamination.

Exact surface water sampling locations will be determined in the field based on conversations with site personnel to identify water discharges to ASU. Sample locations will be recorded in the field logbook as sampling is completed. A sketch of the sample location will be entered into the logbook and any physical reference points will be labeled. If possible, distances to the reference points will be provided.

### **Groundwater Sampling**

#### **Water-Level Measurements**

Static groundwater elevations (DTW) will be measured with a Solinst Water Level Indicator from the top of casing survey mark to the groundwater surface in the well prior to purging.

All field meters will be calibrated according to manufacturer's guidelines and specifications before and after every day of field use. Field meter probes will be decontaminated before and after use at each well.

An electronic sounder, accurate to the nearest +/- 0.01 feet, will be used to measure depth to water in each well. When using an electronic sounder, the probe is lowered down the casing to the top of the water column. The graduated markings on the probe wire or tape are used to measure the depth to water from the surveyed point on the rim of the well casing. Typically, the measuring device emits a constant tone when the probe is submerged in standing water and most electronic water level sounders have a visual indicator consisting of a small light bulb

or diode that turns on when the probe encounters water. Total well depth will be sounded from the surveyed top of casing by lowering the weighted probe to the bottom of the well. The weighted probe will sink into silt, if present, at the bottom of the well screen. Total well depths will be measured by lowering the weighted probe to the bottom of the well and recording the depth to the nearest 0.1 feet.

Water-level sounding equipment will be decontaminated before and after use in each well. Water levels will be measured in wells which have the least amount of known contamination first. Wells with known or suspected contamination will be measured last.

### **Purging**

All wells will be purged prior to sampling. A minimum of three casing volumes of water will be purged using the dedicated well pump.

The Monitoring wells will be purged using a Grundfos Redi-Flo 2- inch submersible pump. Approximately 3 well casing volumes will be purged from each well until pH, Temperature, and Turbidity have stabilized.

Water quality is considered stable if for three consecutive readings:

pH varies by no more than 0.1 pH units, specific conductance readings are within 5% of the average; and turbidity is less than 10 NTUs, or as directed by the onsite geologist.

All wells will be left to recharge until the DTW recovers to at least 80% of the pre-purge value.

Temperature, electrical conductivity, turbidity and pH were measured and recorded during purging to ensure that water reached steady conditions, signifying water was representative of the aquifer.

Water will be collected into a measured bucket to record the purge volume. Casing volumes will be calculated based on total well depth, standing water level, and casing diameter. One casing volume will be calculated as:

$$V = \pi d^2 h / 77.01$$

where: **V** is the volume of one well casing of water (1ft<sup>3</sup> = 7.48 gallons);

**d** is the inner diameter of the well casing (in inches);

**h** is the total depth of water in the well (in feet).

It is most important to obtain a representative sample from the well. Stable water quality parameter (temperature, pH and specific conductance) measurements indicate representative sampling is obtainable.

The water in which measurements were taken will not be used to fill sample bottles.

## Well Sampling

Sampling will be conducted with a Grundfos pump, using a new set of tubing for each well, and transferred directly to laboratory-supplied sample containers. The containers were labeled and placed in a cooler with ice, preserving them for later analysis. Samples will be picked up by a California certified laboratory the next day, in accordance with EPA Chain of Custody procedures and documented.

Field sampling equipment will be cleaned before use, between sample locations, and after completion of fieldwork. Cleaning procedures will consist of a non-phosphate detergent wash, two rinses with tap water, and a final de-ionized water rinse.

At each sampling location, all bottles designated for a particular analysis (e.g., volatile organic compounds) will be filled sequentially before bottles designated for the next analysis are filled (e.g., semivolatile organic compounds). If a duplicate sample is to be collected at this location, all bottles designated for a particular analysis for both sample designations will be filled sequentially before bottles for another analysis are filled. In the filling sequence for duplicate samples, bottles with the two different sample designations will alternate (e.g., volatile organic compounds designation GW-2, volatile organic compounds designation GW-4 (duplicate of GW-2), metals designation GW-2, and metals designation GW-4 (duplicate of GW-2). Groundwater samples will be transferred directly into the appropriate sample containers with preservative, if required, chilled if appropriate, and processed for shipment to the laboratory.

Samples for volatile organic compound analyses will be collected using a low flow at a flow rate of less 1 liter/minute. Vials for volatile organic compound analysis will be filled first to minimize the effect of aeration on the water sample.

After well purging and prior to collecting groundwater samples for metals analyses, the turbidity of the groundwater extracted from each well will be measured using a portable turbidity meter. A small quantity of groundwater will be collected from the well, transferred to a disposable vial and a turbidity measurement will be taken. The results of the turbidity measurement will be recorded in the field logbook. The water used to measure turbidity will be discarded after use. If the turbidity of the groundwater from a well is above 5 Nephelometric Turbidity Units (NTUs), both a filtered and unfiltered sample will be collected. A 5-micron filter will be used to remove larger particles that have been entrained in the water sample. A clean, unused filter will be used for each filtered sample collected. Groundwater samples will be transferred from the filter directly into the appropriate sample containers with a preservative and processed for shipment to the laboratory. When transferring samples, care will be taken not to touch the filter to the sample container. After the filtered sample has been collected, the Teflon tube and filter will be removed, and an unfiltered sample will be collected. A sample number appended with an "FI" will represent a sample filtered with a 5-micron filter. See Section 7.3 for preservation and shipping procedures.

Samples designated for metals analysis will be filtered. A 5-micron filter will be used to remove larger particles that have been entrained in the water sample. A clean, unused filter will be used for each filtered sample collected. Groundwater samples will be transferred from the filter directly into the appropriate sample containers to which preservative has been added and

processed for shipment to the laboratory. When transferring samples, care will be taken not to touch the filter to the sample container. After the filtered sample has been collected, the Teflon tube and filter will be removed and an unfiltered sample will be collected. A sample number appended with an “FI” will represent a sample filtered with a 5-micron filter. See Section 7.3 for preservation and shipping procedures.

## 7.5 Decontamination Procedures

The decontamination procedures that will be followed are in accordance with approved procedures. Decontamination of sampling equipment must be conducted consistently as to assure the quality of samples collected. All equipment that comes into contact with potentially contaminated soil or water will be decontaminated. Disposable equipment intended for one-time use will not be decontaminated, but will be packaged for appropriate disposal. Decontamination will occur prior to and after each use of a piece of equipment. All sampling devices used, including trowels and augers, will be steam-cleaned or decontaminated according to EPA Region 9 recommended procedures.

- Non-phosphate detergent and tap water wash, using a brush if necessary
- Tap-water rinse
- Deionized/distilled water rinse (twice)

Equipment will be decontaminated in a predesignated area on pallets or plastic sheeting, and clean bulky equipment will be stored on plastic sheeting in uncontaminated areas. Cleaned small equipment will be stored in plastic bags. Materials to be stored more than a few hours will also be covered.

## 7.6 Sample Containers, Preservation, Packaging and Shipping

Tables 6-1, 6-2, 6-3, and 6-4 provide detail for sample containers, preservation for all media to be sampled.

### **Surface Soil Samples for metals**

Surface soil samples to be analyzed for metals will be homogenized and transferred from the sample-dedicated homogenization pail into 8-oz, wide-mouth glass jars. A separate container will be collected for each laboratory. Samples will not be chilled. Subsurface samples will be retained in their original brass sleeves or other container unless transferred to bottles.

### **Sediment Samples**

Frozen Encore-sampler samples will be stored for no more than 4 days prior to analysis. If samples are preserved by ejecting into either methanol or sodium bisulfate solution the holding time is two weeks.

Sediment samples, with rocks and debris removed, which are to be analyzed for metals will be homogenized and transferred from the sample-dedicated homogenization pail into 8-oz, wide-mouth glass jars. A separate container will be collected for each laboratory. Samples will not be chilled.

## **Water Samples**

### **Volatile Organic Compounds:**

Low concentration water samples to be analyzed for volatile organic compounds will be collected in 40-ml glass vials. 1:1 hydrochloric acid (HCl) will be added to the vial prior to sample collection. During purging, a test vial will be filled with sample at each sample location and the pH will be measured using a pH meter or pH paper to ensure that sufficient acid is present to result in a pH of less than 2. If the pH is greater than 2, additional HCl will be added to the sample vials. Another vial will be pH tested to ensure the pH is less than 2. The tested vial(s) will be discarded. The sample vials will be filled so that there is no headspace. The vials will be inverted and checked for air bubbles to ensure zero headspace. If a bubble appears, the vial will be discarded and a new sample will be collected. The samples will be chilled to 4°C immediately upon collection. Three vials of each water sample are required for each laboratory.

### **Metals:**

Water samples collected for metals analysis will be collected in 1-liter polyethylene bottles. The samples will be preserved by adding nitric acid (HNO<sub>3</sub>) to the sample bottle. The bottle will be capped and lightly shaken to mix in the acid. A small quantity of sample will be poured into the bottle cap where the pH will be measured using pH paper. The pH must be  $\leq 2$ . The sample in the cap will be discarded, and the pH of the sample will be adjusted further if necessary. The samples will be chilled to 4°C immediately upon collection. One bottle of each water sample is required for each laboratory.

### **Semivolatile Compounds and PAH:**

Water samples collected for semivolatile compounds and PAH will be collected into bottle prepared by the laboratory with required preservative. The bottle will be capped and lightly shaken to mix in the preservative. A small quantity of sample will be poured into the bottle cap where the pH will be measured using pH paper. The pH must be within the appropriate range. The sample in the cap will be discarded, and the pH of the sample will be adjusted further if necessary. Samples will be chilled to 4°C immediately upon collection. Samples from each location that require the same preservative will be placed in the same bottle, if being analyzed by the same laboratory.

The samples will be chilled to 4°C immediately upon collection. Two bottles of each water sample are required for each laboratory.

## **7.7 Packaging and Shipping**

All sample containers will be placed in a strong-outside shipping container (a steel-belted cooler). The following outlines the packaging procedures that will be followed for low concentration samples.

1. When ice is used, pack it in zip-locked, double plastic bags. Seal the drain plug of the cooler with fiberglass tape to prevent melting ice from leaking out of the cooler.

2. The bottom of the cooler should be lined with bubble wrap to prevent breakage during shipment.
3. Check screw caps for tightness and, if not full, mark the sample volume level of liquid samples on the outside of the sample bottles with indelible ink.
4. Secure bottle/container tops with clear tape and custody seal all container tops.
5. Affix sample labels onto the containers with clear tape.
6. Wrap all glass sample containers in bubble wrap to prevent breakage.
7. Seal all sample containers in heavy duty plastic zip-lock bags. Write the sample numbers on the outside of the plastic bags with indelible ink.
8. Place samples in a sturdy cooler(s) lined with a large plastic trash bag. Enclose the appropriate COC(s) in a zip-lock plastic bag affixed to the underside of the cooler lid.
9. Fill empty space in the cooler with bubble wrap or Styrofoam peanuts to prevent movement and breakage during shipment. Vermiculite should also be placed in the cooler to absorb spills if they occur.
10. Ice used to cool samples will be double sealed in two zip lock plastic bags and placed on top and around the samples to chill them to the correct temperature.
11. Each ice chest will be securely taped shut with fiberglass strapping tape, and custody seals will be affixed to the front, right and back of each cooler.

## 8 Disposal of Residual Materials

In the process of collecting environmental samples, the sampling team will generate different types of potentially contaminated IDW that include the following:

- Used personal protective equipment (PPE)
- Disposable sampling equipment
- Decontamination fluids
- Soil cuttings from soil borings
- Purged groundwater and excess groundwater collected for sample container filling

The EPA's National Contingency Plan (NCP) requires that management of IDW generated during sampling comply with all applicable or relevant and appropriate requirements (ARARs) to the extent practicable. The sampling plan will follow the Office of Emergency and Remedial Response (OERR) Directive 9345.3-02 (May 1991), which provides the guidance for the management of IDW. In addition, other legal and practical considerations that may affect the handling of IDW will be considered.

- Used PPE and disposable equipment will be double bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill.

Any PPE and disposable equipment that is to be disposed of which can still be reused will be rendered inoperable before disposal in the refuse dumpster.

- Decontamination fluids that will be generated in the sampling event will consist of deionized water, residual contaminants, and water with non-phosphate detergent. The volume and concentration of the decontamination fluid will be sufficiently low to allow disposal at the site or sampling area. The water (and water with detergent) will be transferred to Tank 40001 to be processed by the RO Unit and reused.
- Soil cuttings generated during the subsurface sampling will be drummed and samples collected for waste profiling. Once the profile is complete the soils will be disposed of in an appropriate manner.
- Purged groundwater will be transferred to Tank 40001 to be processed by the RO Unit and reused.

## 9 Sample Documentation and Shipment

### 9.1 Field Notes

This section discusses record keeping in the field. This may be through a combination of logbooks, pre-printed forms, photographs or other documentation.

#### **Field Logbooks**

At a minimum, the following information will be recorded during the collection of each sample:

- Sample location and description
- Site or sampling area sketch showing sample location and measured distances
- Sampler's name(s)
- Date and time of sample collection
- Designation of sample as composite or grab
- Type of sample (soil, sediment or water)
- Type of sampling equipment used
- Field instrument readings and calibration
- Field observations and details related to analysis or integrity of samples (e.g., weather conditions, noticeable odors, colors, etc.)
- Preliminary sample descriptions (e.g., for soils: clay loam, very wet; for water: clear water with strong ammonia-like odor)
- Sample preservation
- Lot numbers of the sample containers, sample identification numbers and any explanatory codes, and chain-of-custody form numbers
- Shipping arrangements (overnight air bill number)
- Name(s) of recipient laboratory(ies)



In addition to the sampling information, the following specific information will also be recorded in the field logbook for each day of sampling:

- Team members and their responsibilities
- Other personnel on site
- Summary of any meetings or discussions with tribal, contractor, or federal agency personnel
- Deviations from sampling plans, site safety plans, and QAPP procedures
- Changes in personnel and responsibilities with reasons for the changes
- Levels of safety protection
- Calibration readings for any equipment used and equipment model and serial number

### **Photographs**

Photographs will be taken at the sampling locations and at other areas of interest on the site or sampling area. They will serve to verify information entered in the field logbook. For each photograph taken, the following information will be written in the logbook or recorded in a separate field photography log:

- Time, date, location, and weather conditions
- Description of the subject photographed
- Name of person taking the photograph

## **9.2 Labeling**

All samples collected will be labeled in a clear and precise way for proper identification in the field and for tracking in the laboratory. A copy of the sample label is included in Appendix \_\_\_\_\_. The samples will have pre-assigned, identifiable, and unique numbers. At a minimum, the sample labels will contain the following information: station location, date of collection, analytical parameter(s), and method of preservation. Every sample, including samples collected from a single location but going to separate laboratories, will be assigned a unique sample number.

## **9.3 Sample Chain-Of-Custody Forms and Custody Seals**

All sample shipments for analyses will be accompanied by a chain-of-custody record. Form(s) will be completed and sent with the samples for each laboratory and each shipment (i.e., each day). If multiple coolers are sent to a single laboratory on a single day, form(s) will be completed and sent with the samples for each cooler.

The chain-of-custody form will identify the contents of each shipment and maintain the custodial integrity of the samples. Generally, a sample is considered to be in someone's custody if it is either in someone's physical possession, in someone's view, locked up, or kept in a secured area that is restricted to authorized personnel. Until the samples are shipped, the custody of the samples will be the responsibility of ZMassociates. The sampling team leader or

designee will sign the chain-of-custody form in the “relinquished by” box and note date, time, and air bill number.

## 10 Quality Control

### 10.1 Field Quality Control Samples

#### **Assessment of Field Contamination (Blanks)**

Field contamination is usually assessed through the collection of different types of blanks. Equipment blanks are obtained by passing distilled or deionized water, as appropriate, over or through the decontaminated equipment used for sampling. They provide the best overall means of assessing contamination arising from the equipment, ambient conditions, sample containers, transit, and the laboratory. Field blanks are sample containers filled in the field. They help assess contamination from ambient conditions, sample containers, transit, and the laboratory. Trip blanks are prepared by the laboratory and shipped to and from the field. They help assess contamination from shipping and the laboratory and are for volatile organic compounds only. Region 9 recommends that equipment blanks be collected, where appropriate (e.g., where neither disposable nor dedicated equipment is used). Field blanks are next in priority, followed by trip blanks. Only one type of blank must be collected per event, not all three.

A maximum of one blank sample per matrix per day should be collected, but at a rate not to exceed one blank per 10 samples. The 1:10 ratio overrides the one per day requirement. If equipment rinsate blanks are collected, field blanks and trip blanks are not required under normal circumstances.

#### **Equipment Blanks**

Equipment rinsate blanks will be collected to evaluate field sampling and decontamination procedures by pouring High Performance Liquid Chromatography (HPLC) organic-free (for organics) or deionized water (for inorganics) over the decontaminated sampling equipment. One equipment rinsate blank will be collected per matrix each day that sampling equipment is decontaminated in the field. Equipment rinsate blanks will be obtained by passing water through or over the decontaminated sampling devices used that day. The rinsate blanks that are collected will be analyzed for volatile organic compounds.

The equipment rinsate blanks will be preserved, packaged, and sealed in the manner described for the environmental samples. A separate sample number and station number will be assigned to each sample, and it will be submitted blind to the laboratory.

#### **Field Blanks**

Field blanks will be collected to evaluate whether contaminants have been introduced into the samples during the sampling due to contamination from sample containers. Field blank samples will be obtained by pouring deionized water into a sampling container at the sampling point. The field blanks that are collected will be analyzed for metals.

The field blanks will be preserved, packaged, and sealed in the manner described for the environmental samples. A separate sample number and station number will be assigned to each sample, and it will be submitted blind to the laboratory.

### **Trip Blanks**

Trip blanks will be prepared to evaluate if the shipping and handling procedures are introducing contaminants into the samples, and if cross contamination in the form of VOC migration has occurred between the collected samples. A minimum of one trip blank will be submitted to the laboratory for analysis with every shipment of samples for VOC analysis. Trip blanks are 40-mL vials that have been filled with HPLC-grade water that has been purged so it is VOC free and shipped with the empty sampling containers to the site or sampling area prior to sampling. The sealed trip blanks are not opened in the field and are shipped to the laboratory in the same cooler with the samples collected for volatile analyses. The trip blanks will be preserved, packaged, and sealed in the manner described for the environmental samples. A separate sample number and station number will be assigned to each trip sample and it will be submitted blind to the laboratory.

### **Temperature Blanks**

For each cooler that is shipped or transported to an analytical laboratory a 40-mL VOA vial will be included that is marked “temperature blank.” This blank will be used by the sample custodian to check the temperature of samples upon receipt.

### **Assessment of Field Variability (Field Duplicate or Co-located Samples)**

Duplicate samples are collected simultaneously with a standard sample from the same source under identical conditions but are placed into separate sample containers. Field duplicates will consist of a homogenized sample divided in two or else a co-located sample. Each duplicate portion should be assigned its own sample number so that it will be blind to the laboratory. A duplicate sample is treated independently of its counterpart to enable assessment of laboratory performance through comparison of the results. At least 10% of samples collected per event should be field duplicates. At least one duplicate should be collected for each sample matrix, but collection can be stretched out over more than one day (e.g., if it takes more than one day to reach 10 samples). Every group of analytes for which a standard sample is analyzed will also include the analyses of one or more duplicate samples. Duplicate samples should be collected from areas of known or suspected contamination. Since the objective is to assess variability due to sampling technique and possible sample heterogeneity, source variability is a good reason to collect co-located samples, not to avoid their collection

Soil samples for volatile organic compound analyses will not be homogenized. Equivalent samples from a co-located location will be collected identically to the original samples, assigned unique sample numbers and sent blind to the laboratory.

Water duplicate samples will be collected from one of the newly installed groundwater monitoring wells. When collecting duplicate water samples, bottles with the two different sample identification numbers. Duplicate samples will be preserved, packaged, and sealed in

the same manner as other samples of the same matrix. A separate sample number and station number will be assigned to each duplicate, and it will be submitted blind to the laboratory.

## 10.2 Background Samples

No background samples will be collected.

## 10.3 Field Screening, Confirmation and Split Samples

No field screen, confirmation and split samples will be collected.

## 10.4 Laboratory Quality Control Samples

Laboratory quality control (QC) samples are analyzed as part of standard laboratory practice. The laboratory monitors the precision and accuracy of the results of its analytical procedures through analysis of QC samples. Typically, laboratory QC samples consist of matrix spike/matrix spike duplicate (MS/MSD) samples for organic analyses, and matrix spike and duplicate samples (MS/DS) for inorganic analyses. The term “matrix” refers to use of the actual media collected in the field (e.g., routine soil and water samples).

The certified laboratory will prepare QC samples using their inhouse protocol and QC measures.

# 11 FIELD VARIANCES

As conditions in the field may vary, it may become necessary to implement minor modifications to sampling as presented in this plan. When appropriate, the QA Office will be notified, and a verbal approval will be obtained before implementing the changes. Modifications to the approved plan will be documented in the sampling project report.